

said microcontroller further programmed to receive said voltages produced by said circuit sensing AC voltage and from said circuit for sensing AC current,

said microcontroller further programmed to calculate the AC resistance of said thermoelectric device from said voltages;

As
end
said microcontroller further programmed to compensate for ambient temperature error by performing a polynomial calculation; and

said microcontroller further programmed to store said compensated AC resistance measurement.

REMARKS

This application, as amended herein, contains claims 1, 3-33, 40 and newly added claims 41 and 42. Claims 2 and 34-39 have been cancelled.

By amendment herein, a series of changes have been made in the specification to improve its form. No new matter has been added.

Claims 1 and 31 have been amended to deal with the specific objections thereto.

Claims 1-24 and 30 were rejected under 35 U.S.C. 112, second paragraph. It is respectfully submitted that the amendments

made in claims 1, 13 and 30 render the claims definite within the meaning of 35 U.S.C. 112, second paragraph.

By amendment herein, almost all limitations of claim 2 have been included in claim 1. Claims 2-24, 30 and 33-38 were rejected under 35 U.S.C. 103(a) as being unpatentable over Atwood et al. ('610) in view of Horn et al ('828). This rejection is respectfully traversed.

Claim 1, as amended herein, includes the recitation of:
a pin having a first end and a second end, said first end in close contact with said sample block and said second end in close contact with said heatsink so as to provide a thermal path between said sample block and said heatsink. It is respectfully submitted that neither Atwood et al. nor Horn et al teach or suggest this limitation. In fact the prior art actually teaches away from anything of this sort.

The entire teachings of Atwood et al are directed to minimizing the flow of heat from the samples to the heatsink, except under the control of liquid flowing through channels in the sample block. In fact, there are no "heat leaks" at all in Atwood et al between the sample block and the heatsink. The portion of Atwood et al that the Examiner has cited with respect to this limitation of claim 2 (column 9, lines 46-52 and column 12, lines 15-44) is completely silent on this point. Further, a diligent review of Atwood et al. has revealed no similar structure of any kind.

As noted in the present specification, on page 8, lines 10-18, this "heat leak" serves to reduce the temperature at the

center of the block and thus reduces the thermal gradient across the block. Further, this pin has the advantage of serving to help lock into place components of the assembly.

Horn et al. adds absolutely nothing in this regard to the teachings of Atwood et al. Horn et al is merely directed to making thermoelectric elements. There is no structure as set forth in claim 1 evenly remotely suggested in Horn et al.

In view of the above, it is respectfully submitted that claim 1 is directed to patentable subject matter. Further, in view of claim 33 having the same recitation as claim 1 which was discussed above, it is respectfully submitted that claim 33 is also directed to patentable subject matter for exactly the same reasons.

Many of the remaining claims depend from independent claim 1. These claims recite further limitations, which in combination with the limitations of claim 1, are not shown or suggested in the art of record. Some of these claims are discussed below.

Claim 25 was rejected under 35 U.S.C. 102(b) as being anticipated by Atwood et al. It is respectfully pointed out that the Examiner has completely misread this reference.

Claim 25 recites: a platen, vertically and horizontally displaceable in relationship to said vials, said platen including, an array of openings corresponding to locations of said vials, said openings having a perimeter corresponding to a perimeter of said vials; and a skirt extending downward around the perimeter of said platen, said skirt having

dimensions corresponding to the perimeter of a standard microtiter tray, said skirt constructed to engage said perimeter of said tray during vertical displacement of said platen, causing said openings in said platen to engage said perimeter of said vials, applying a seating force on said vials for maintaining a snug fit between walls of said sample vials and said assembly for receiving said sample vials. There limitations are not taught or even suggested in Atwood for the following reasons.

The structure in Atwood et al. that the Examiner has relied on in rejecting claim 25 is not a part of the platen. It is a separate two piece vial holder assembly. In this regard, reference is made to Fig. 19 of Atwood et al. and the text at column 34, lines 20-35. In fact, the platen 14, as taught by Atwood et al. is completely flat at its bottom where it comes into contact with the vial caps. The structure that the Examiner is mistakenly referring to is the separate two piece assembly including a tray 340. If the Examiner has any doubt about this, he is respectfully referred to United States Patent No. 5,710,381 entitled "Two Piece Holder for PCR Sample Tubes" which issued on a divisional application of the Atwood et al. reference. This patent is much shorter than the '610 patent, and contains a description of just the portions relevant to the two piece holder, which is merely a small part of the Atwood et al. patent cited by the Examiner.

The structure of claim 25 has the great advantage of eliminating the need for the two piece holder. The structure of claim 25 recited above permits the vials to be placed directly in the sample wells and to have the platen directly apply pressure to the periphery of the vial caps without using

a tray or other structure at all. It is thus submitted that Atwood et al. does not disclose or suggest claim 25, and that claim 25 is thus directed to patentable subject matter.

Newly added claim 41 contains recitations essentially similar to original claim 25. In other words, it represents claim 25 rewritten in independent form. For the reasons set forth above with respect to claim 25, it is submitted that claim 41 is also directed to patentable subject matter.

Claim 27 contains the recitations of: a bi-polar amplifier circuit for providing power to said thermal electrical device; a circuit for sensing AC voltage across said thermal electric device and producing a DC voltage representing said AC voltage; a circuit for sensing AC current through said thermal electric device and producing a DC voltage representing said AC current; a microcontroller programmed to receive said signals from said first and second temperature sensors; said microcontroller further programmed to cause said bi-polar amplifier to provide power to said thermal electric device so that said first and second temperature sensor signals indicate equal temperatures; said microcontroller further programmed to cause an AC voltage to be superimposed on said bi-polar amplifier power; said microcontroller further programmed to receive said voltages produced by said circuit sensing AC voltage and from said circuit for sensing AC current; said microcontroller further programmed to calculate the AC resistance of said thermal electrical device from said voltages; said microcontroller further programmed to compensate for ambient temperature error by performing a polynomial calculation; and said microcontroller further

programmed to store said compensated AC resistance measurement.

As noted in the present specification at page 22, lines 4-11, the precise measurement of heater resistance is an important indicator of imminent heater failure. Applicants' invention, as set forth in claim 27 provides a way to clearly predict such imminent heater failure.

It is respectfully submitted that Atwood et al. does not teach or suggest the limitations of claim 27 noted above.

First, the power amplifier in Atwood et al. is clearly not bipolar and does not apply an AC voltage. It is respectfully submitted that the Examiner's reliance on Fig. 10 and the accompanying text is misplaced. The text, at column 10, lines 1-3 clearly indicates that the voltage is rectified to eliminate the negative half cycle. Only positive half cycles remain. Thus there is no reversal of the polarity of the voltage applied to the heater.

Second, because there is no AC voltage applied to the heater in Atwood et al., there is no reason for sensing AC voltage and AC current applied to the heater, or for computing an AC resistance of the heater as recited in claim 27. The portions of Atwood et al. that the Examiner has cited in this regard are simply not relevant.

Finally, Atwood et al. does not teach or suggest performing a polynomial calculation with the microcontroller further programmed to store said compensated AC resistance measurement using this calculation. All of the calculations performed in the portions of Atwood et al. cited by the Examiner are

directed to the calculation of the power that is applied to the heater. There is no teaching or suggestion in Atwood et al. of using such calculations to compensate for the calculation of the resistance of the heater.

In view of the above, it is respectfully submitted that claim 27 is directed to patentable subject matter. Further, newly added claim 42 is essentially original claim 27 rewritten in independent form. For the reasons set forth above with respect to claim 27, it is respectfully submitted that new claim 42 is directed to patentable subject matter.

Method claim 28 contains many of the limitations of apparatus claim 27 in method format. For at least the first two reasons set forth above for claim 27, it is submitted that claim 28 is also directed to patentable subject matter. Further, for all of the reasons set forth above with respect to claim 27, it is submitted that claim 28 is also directed to patentable subject matter. Finally, for the same reasons, it is respectfully submitted that claim 40 is also patentable over the art of record.

Claim 30 was rejected for reasons stated above. The rejection is respectfully traversed for the following reasons.

First, claim 30 is specifically directed to achieving linear temperature transitions. This is why measurements must be made as a function of temperature, including the temperature of the thermoelectric device. The portions of Atwood et al. and Horn et al. do not even suggest taking measurements as a function of temperature.

Second, the Examiner has admitted that many of the limitations of claim 30 are not shown in either of the cited references, but has taken official notice. In accordance with MPEP Section 2144.03, Applicants challenge the assertion by the Examiner that the limitations cited are well known in the art and request that a reference be cited by the Examiner. Thus, the Examiner must either cite a reference to support his position or allow the claim.

Claim 31 includes the recitation: calculating temperature of said mixture as a function of said temperature of said sample block, said temperature applied by said cover, said thermal resistance of said vial between said sample block and said mixture, said thermal resistance of air in parallel with said vial between said mixture and said cover, said thermal capacitance of said mixture and said thermal capacitance of said vial between said mixture and said cover. It is not seen where in the cited portions of Atwood et al. there is any reference to the thermal resistance of air in parallel with the vial, or the thermal capacitance of the vial between the mixture and the cover. Atwood et al. appears to be completely silent with respect to these limitations. If any limitation is not taught by the cited reference, then there can be no anticipation. Further there is nothing in Atwood et al. to render claim 31 obvious. Allowance of claim 31 is respectfully requested.

Claim 32 has been amended herein to note that the memory device in which power calibration information is stored is located on the block-heater assembly itself. Support for this amendment can be found in the specification in the paragraph bridging pages 21 and 22. As noted therein, this provides the

unique advantage of permitting the block assembly to be moved from instrument to instrument and still perform within specification, because the calibration information and the assembly move together as a unit.

Atwood et al. does not teach or suggest claim 32, as amended herein. In Atwood et al., calibration information is stored in the main apparatus itself, as noted by the Examiner. The advantage noted above is not present in Atwood et al. Thus, allowance of claim 32 is respectfully requested.

For all of the foregoing reasons, it is respectfully submitted that all of the claims now present are clearly novel and patentable over the prior art of record. Accordingly, favorable reconsideration and allowance are respectfully requested. Should any unresolved issue remain, the Examiner is invited to call Applicants' Attorney at the telephone number indicated below.

Applicants petition for an extension of time of two months in which to file a response. Please charge deposit account No. 16-1350 in the amount of \$390.00 for the two month extension. A duplicate of this last page is enclosed.

Respectfully submitted,

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OCTOBER 10, 2000

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Name of Person Making Deposit

Serial No. 09/075,392

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